# EDUCATION AND TRAINING IN INTEGRATED COASTAL MANAGEMENT:

### Lessons from the International Arena

### **by**

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### **Background: Global Interest in Integrated Coastal Management**

As is well known, the concept of "integrated coastal management" (ICM) was embraced by nations around the world as a central concept in the management of coastal zones and ocean areas under national jurisdiction in Chapter 17 of Agenda 21, adopted at the United Nations Conference on Environment and Development (UNCED), also referred to as the Earth Summit, held in Rio de Janeiro, Brazil, in June 1992. Chapter 17 stresses both the importance of oceans and coasts in the global life-support system and the positive opportunity for sustainable development which ocean and coastal areas represent.

Since UNCED, ICM has come to be adopted as a major organizing framework in all of the major ocean and coastal international agreements emanating from UNCED. These include the Framework Convention on Climate Change, the Convention on Biological Diversity, the Programme of Action for the Protection of the Marine Environment from Land-Based Activities, the Plan of Action for the Sustainable Development of Small Island Developing States, and the International Coral Reef Initiative (Cicin-Sain, Knecht, and Fisk 1995). As well, a

number of efforts have been made to develop international guidelines on integrated coastal management. Such efforts include guidelines by the World Bank (1993), World Coast Conference report (1994), IUCN (1993), UNEP (1995), OECD (Organisation for Economic Cooperation and Development) (1991), in relation to the climate change convention (1997), and guidelines summarizing good practices in integrated coastal management (1996) (see Cicin-Sain, Knecht, and Fisk 1995; Chua 1996; Cicin-Sain *et al.* 1997).

Integrated Coastal Management (ICM) has been defined as:

"... a continuous and dynamic process by which decisions are taken for the sustainable use, development, and protection of coastal and marine areas and resources. ICM acknowledges the interrelationships that exist among coastal and ocean uses and the environments they potentially affect, and is designed to overcome the fragmentation inherent in the sectoral management approach.

ICM is multi-purpose oriented, it analyzes implications of development, conflicting uses, and interrelationships between physical processes and

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human activities, and it promotes linkages and harmonization among sectoral coastal and ocean activities." (Cicin-Sain and Knecht 1998)

ICM is needed because of two major reasons: 1) the effects ocean and coastal uses, as well as activities farther upland, can have on ocean and coastal environments, and 2) the effects ocean and coastal users can have on one another A central aspect of ICM is the concept of "integration." Several dimensions of integration are involved in ICM: 1) intersectoral integration (integration among different coastal and marine sectors, such as fisheries, oil and gas development, coastal fisheries); 2) intergovernmental integration (integration different levels of government - national, provincial, local); 3) spatial integration (integration between the land and ocean sides of the coastal zone); 4) sciencemanagement integration (integration among the different disciplines important in coastal and ocean management [the natural sciences, the social sciences, engineering], and the management entities); and 5) international integration (when nations border enclosed or semi-enclosed seas or there are international disputes over fishing activities, transboundary establishment of maritime boundaries, passage of ships, and other issues) (Cicin-Sain and Knecht 1998).

Achieving integrated management along the dimensions referred to above is perhaps the most difficult challenge in managing oceans and coasts. Bringing together and harmonizing the perspectives of divergent sectoral government agencies, of different levels of government (each with their own interests, mandates, perspectives), and of different disciplines (each with different outlooks, language, and methodologies) represents a most challenging set of tasks. As was emphasized in Cicin-Sain and Knecht (1998), to achieve integrated management, it is very important to have incentives that promote continued collaboration among ICM entities. Similarly important is to provide training and education programs which emphasize interrelationships among coastal and ocean activities, uses, natural systems, and physical processes, and which develop the appropriate mindsets and skills that coastal managers will need in their work.

### ICM and the Traditional Organization of the Sciences and of Government

The way the sciences concerned with the study and analysis of oceans and coasts and, as well, the way that governments have been organized to deal with oceans and coasts, have largely been oriented around single disciplines and single sectors. In terms of the sciences, for

example, single disciplines such as geology have been applied to coastal problems such as those associated with coastal erosion and the longshore drift of sediments. The discipline of physical oceanography has been brought to bear to determine the magnitude and direction of the ocean currents and waves that affect the beach and its stability, the engineering sciences have been employed to design and build structures to mitigate the impacts of coastal erosion, the social sciences have been applied to determine the behavior of coastal residents and user groups and the capacity of government agencies in coastal and ocean management.

In general, different disciplines concerned with the study of oceans and coasts have operated independently, utilizing different language, and with different underlying worldviews and incentive structures (NRC 1995). As noted in the U.S. National Academy of Sciences report on Policy, and the Coast: *Improving* Decisionmaking, "all scientific disciplines develop technical language that reflects specialized and in-depth knowledge of their subject. Specialized training and the predominantly within-discipline interactions reinforce the use of discipline-specific technical language and build barriers to wider communication" (NRC 1995, p. 45). Similarly, as noted by the NRC report, "the professional training of natural and social scientists is based on different paradigms of ecosystems, particularly with regard to the role of human. . . the natural scientists often view humans as intruders in ecosystems, whereas social scientists generally consider an ecosystem as a provider of services to humans. . . " (NRC 1995, p. 45). Moreover, there are many incentives (such as publication in owndiscipline outlets) that maintain and reinforce separation among disciplines; "own-discipline publications are generally more highly regarded than interdisciplinary outlets" (NRC 1995, p. 45).

Similarly, governmental functions and programs concerned with oceans and coasts tend to be organized around specific resources or problems such as fisheries or the mitigation of natural hazards and not generally around particular geographical areas requiring an integrated approach such as the coastal zone. Indeed, the government organization for the management of oceans and coasts traditionally grew out of the management of single activities or sectors of ocean activity, such as shipping, fishing, and oil and gas development.

The single resource or single sector approach is a carryover from the time when ocean resources were viewed as unlimited and ocean uses as independent of one another. At relatively low levels of ocean use, activities may be able to be considered in isolation one from the

other but as ocean uses proliferate, one use impacts on another until single sector planning and management becomes untenable. Complicating the situation still further are the pressures being put on the coastal zone and their resources by populations that are burgeoning through coastal migrations.

Integrated coastal management, in effect, represents a new paradigm of management for the managers, and a new way of thinking and educating for the scientists. Capacity building efforts thus need to be made in two areas: 1) to re-orient existing managers of ocean and coastal areas toward a more holistic perspective of understanding the interrelationships that exist among multiple human use activities in coastal areas and their ecological impacts; and 2) to train and educate a cadre of coastal professionals in a multidisciplinary manner emphasizing the inter-relationships among multiple human activities, and natural and physical processes in the coastal zone.

### Purpose of the Paper

In this paper, we are primarily interested in the second aspect of capacity building – training and education of the next generation of coastal professionals, although we also refer, to some extent, to the question of in-service training for existing coastal professionals. The paper first examines past efforts at defining capacity building needs in ICM, reviews current experiences with education and training in ICM, and raises a number of issues for consideration by scientists and decision-makers concerned with ICM capacity building.

### Defining Needs for Capacity Building in Integrated Coastal Management

"Capacity building" is a central concept in Agenda 21 and in other UNCED agreements. As defined by the UN Development Programme (UNDP) and the UN Division of Law of the Sea (UNDOALOS) in 1994, "capacity-building involves human resource development, the development of organizations and promoting the emergence of an overall policy environment conducive to the generation of appropriate responses to emerging needs" (UNDP/UNDOALOS 1994). A less formal definition of capacity building in the context of integrated coastal management might be:

The design and conduct of the range of activities necessary to enhance the capacity of institutions and the individuals that comprise them to undertake effective ICM programs.

It could be argued that the aim of a capacity building effort should be to create a situation wherein outside or external assistance is no longer needed, that is, to have educational and training facilities in place that will meet the needs for skilled ICM professionals in a particular nation. Seen in this way, the goal would be to create the national capacity (or on a regional basis) in universities and in training centers to produce people with the required skills. The challenge, then, is to decide on the range of skills necessary and to assist the in-country educational facility in gearing up to meet these newly identified needs. This generally means assisting in the design and creation of new courses, the production of training materials (texts, notes, cases, etc.), and working with the faculty and/or instructors that will be involved in conducting the new programs.

One generally thinks of capacity building in the developing nation context. However, in our view, capacity building should also be applied to developed nations as well. ICM is a novel paradigm for developed and developing nations alike. Hence, there is a similar need to reorient existing coastal managers, and to train and educate them in a more multidisciplinary and integrated manner. The difference, though, is that in the developed countries one is building on a base of sectoral and discipline-based expertise, which is often absent in developing nations.

Later in the paper, we discuss the special challenges associated with teaching multidisciplinary thinking and integration. Suffice it to say here that instilling these concepts through training and education is not necessarily easier in the developed country context. Resource management programs in more developed nations have generally been in place longer than in their less developed counterparts which usually means that some rigidity has set in and that "turf" (mission) is carefully guarded, making effective inter-agency cooperation more difficult. Therefore, one might expect to see a different emphasis in the capacity building efforts depending on the maturity of the institutions involved.

### Past Efforts to Define Capacity Building Needs in ICM

There have been a number of efforts in the past several years to estimate the demand for coastal professionals, to assess needs for ICM training and education, to develop models of ICM training and education, and to develop strategies for carrying out ICM capacity building at global, regional, national, and subnational scales. The results of the most important of these efforts are given below.

Sardinia, 1993. Meeting organized by UNDP and UNDOALOS (UNDP/ UNOALOS 1994).

### Meeting objectives:

To develop an Action Plan for Human Resources Development and Capacity Building for the Planning and Management of Coastal and Marine Areas, 1993-1997. The Action Plan includes activities in four areas: capacity building, institution-building, training programs, and mechanisms for implementation.

### Key recommendations:

- 1. Review existing and planned training programs in coastal and ocean management (objectives, scope, target groups, curricula, training techniques, delivery systems, etc.).
- 2. Establish a data base for comparative analysis of training programs and exchange of courses/materials.
- 3. Conduct training needs assessments at national, regional, and sub-regional levels.
- 4. Establishment of an international, decentralized system for the development and sharing of high quality standardized course material.
- 5. Adjustment of content of training courses to fit three target groups: policy makers/planners; coastal and marine managers; and users, operators, and implementors.

### Coastal Zone Canada '94 (Coastal Zone Canada Association 1994)

### Meeting objectives:

Identify the knowledge and skills required for today's coastal managers.

Discuss the components of a core curriculum for training sessions and university degree programs.

Discuss standards and criteria that must be met to make integrated coastal management a consistent and internationally recognized discipline.

Estimate time-scales and costs associated with establishing required programs.

#### Key recommendations:

1. Produce coastal management graduates with analytical, planning, and management abilities.

- 2. Training programs should be interdisciplinary in focus and the curriculum should establish common cross-sectoral resources use objectives and introduce conflict resolution principles.
- 3. Training programs should be flexible and adaptable reflecting local cultural characteristics, government structure, resource integrity, and management needs.
- 4. In order for coastal zone management educational programs to be initiated and continually supported, governments have to be (first) convinced of the importance of managing coastal resources.

### Rhode Island, 1995 (Crawford, Cobb, and Ming 1995)

### Objectives:

To bring together academics and experienced coastal management professionals to define the needs of the profession, review existing programs, and suggest ways in which universities can meet the growing demand for coastal management professionals.

### **Key recommendations**:

- A strategy is needed that emphasizes long-term capacity building efforts and the role of universities to complement and enhance existing initiatives and activities.
- 2. Universities should develop and/or strengthen interdisciplinary education programs that will contribute to ICM.
- 3. Master's degrees in coastal management are needed which provide the intellectual core curriculum for professional managers who are responsible for the design and leadership of coastal management programs.
- 4. The framework curriculum for a degree program in coastal management should include: theory and knowledge in ICM, tools such as geographic information systems (GIS), methods and skills in planning, management, socio-economic and group processes, practical field experience, ethics of public service and resource allocation, and cultural literacy.
- 5. University capacity should be developed to meet two kinds of needs: 1) short-term training needs which provide an orientation to the ICM field and develop specific skills and 2) provide longer term education programs that offer more depth and experience.
- 6. Governments should work to fulfill the expectations of Agenda 21 and provide leadership in articulating firm and sustained ICM policy objectives that can form the basis for building capacity of current and future coastal managers.

### **Review of Selected Education and Training Efforts in Integrated Coastal Management**

In general, we can identify two major types of capacity building efforts: 1) those involving university-based degree programs on ICM or closely related subjects, and 2) those involving specific ICM courses (generally short courses). There is often, of course, overlap between these two categories. ICM short courses can be taught in the context of an ICM degree program, for example, ICM short courses organized by a non-university entity could be built upon for the creation of a degree, etc. Other types of capacity building efforts include activities by research centers in the field; ICM pilot programs (which offer "hands-on" practical training); the preparation and dissemination of specialized books; manuals, collected core studies, etc.; the preparation and maintenance of specialized ICM web sites; and periodic specialized conferences, workshops, and seminars on ICM. Table 1 provides our own conservative estimate of the number of efforts ongoing under these various categories of ICM capacity building around the world.

Table 1. Types of capacity building for ICM

Types of Capacity-Building for ICM	Estimated member·
Short term courses (per year)	40
University courses (part of degree programs)	40
Research Centers	>60
Pilot programs (on the ground)	~75
Specialized books, manuals, collected case studies, etc.	~24
Specialized ICM web sites	~40
Periodic specialized conferences, workshops, seminars, etc. (per year)	~24

#### Degree Programs in ICM

There is a growing number of degree programs in integrated coastal management, coastal management, marine policy, marine affairs, around the world. In the United States, for example, significant efforts to teach integrated coastal management, as part of the field of marine affairs and policy, began in the early 1970s and have been growing ever since. Among the original pioneers in the field (established in the late 1960s and early 1970s) may be found the University of Rhode

Island, the University of Washington, and the University of Delaware. There are now about 20 such educational institutions in the field in the U.S. The characteristics of a number of U.S. degree programs in marine affairs and policy are shown in Table 2. Table 3 shows the same type of information for U.S. programs with a concentration or specialization in marine affairs/marine policy as part of another degree

There is an ever-growing number of degree programs in the field in other countries around the world, as shown in Table 4. Some of these are very well established and have been operating for years, such as the marine policy and coastal management program at the University of Wales at Cardiff. Most of the others are of quite recent vintage, and announcements about the creation of new programs can be seen frequently on such communications networks as Coastnet.

#### Research Centers

There is, as well, a growing number of research centers doing work related to ICM around the world. Such research centers provide opportunities for training of ICM professionals; provide advice to governments, NGOs, and the private sector on ICM methods and practices; carry out ICM filed projects; conduct research on the effectiveness of ICM approaches; convene conferences and workshops; and prepare and disseminate publications on the subject. Table 5 provides a preliminary list of 53 research centers in the field.

### Courses in ICM

There are many courses on ICM currently being taught around the world by a variety of institutions. Some of these courses are university-based, others are related to United Nations institutions or to institutions especially created for ICM teaching and training. There is great variety among these courses, some are very short in duration (2-3 days), others may be a month or longer. The course content also varies - some emphasize the natural science aspects of ICM, others the law and policy aspects, and yet others the integration aspects of ICM. Courses vary, too, according to the level at which they are being taught (graduate, undergraduate levels, for example), and the type of course participants involved (university students, established coastal management professionals, government personnel, non-governmental organizations, staff from donor institutions).

Some of the ICM courses being taught are part of global training networks. There are several examples in this category: The Train-Sea-Coast Program (organized by

Table 2. Degree programs in Marine Affairs and Policy in the United States

Institution & Program	When Established	Average Number of Enrolled Students	Degree(s) Granted	Degree Requirements
University of Rhode Island Graduate Program in Marine Affairs	1969	60	M.M.A. M.A.M.A.	M.M.A.: 30 semester hours (non-thesis) M.A.M.A.: 39 credits and thesis
University of Washington School of Marine Affairs	1972	60	M.M.A.	61 quarter hours and thesis
University of Delaware Graduate College of Marine Studies	1973	25	Master of Marine Policy; Ph.D. in Marine Studies	Master's: 33 semester hours and thesis. Ph.D.: 30-45 semester hours and dissertation
Oregon State University Marine Resources Mgmt Program	1974	20	M.S.	66 quarter hours: 60 course credits and 6 project or internship, or 57 course credits and 9 thesis credits
Florida Institute of Technology Division of Marine and Environmental Systems	1974	N.A.	M.S. in C.Z.M.	30 semester hours, including 6 hours of thesis or 33 semester hours (non-thesis) of courses
University of Virginia Dept. of Environmental Sciences Marine Affairs Program	1980	12	M.S. in Marine Affairs	
University of Miami Division of Marine Affairs and Policy	1981 1981	30 (15/yr) 80	M.A. in Marine Affairs B.A. in Marine Affairs	24 semester hours of courses; 6 credits of internship
Nova University Oceanographic Center	Late 1980s	~20	M.S. in C. Z.M.	Thesis = 36 quarter hours Non-thesis = 45 quarter hours

Source: Hersman and Schorr (1996).

the UN Division for Ocean Affairs and the Law of the Sea. with support from the UN Development Programme, Science, Technology and Private Sector Division) involves institutions in 11 countries in all major geographical areas of the world; each institution in the network develops a course or set or courses in ocean and coastal management, using a very detailed common methodology. Another major example of a global training network in ICM is the International Ocean Institute (IOI). An independent, non-governmental, international, nonprofit organization, IOI (headquartered in Malta) has grown from two to 10 operational centers in different countries. The IOI is aimed at training of persons in developing countries and has received significant support from the Global Environment Facility (Mann Borgese 1998).

There are also many efforts at ICM training at the regional level. Major examples include the NETTLAP program which is organized by UNEP and represents an effort to coordinate environmental programs at the tertiary (university) level in the Asia Pacific region (Hay and Chou 1993), the Canada/ASEAN marine science program which aims to build the technical capacity of marine scientists in the ASEAN region, the MEDCOAST campus program which aims to develop expertise in integrated coastal management for coastal management personnel from the countries bordering the Mediterranean region (Özhan 1997), and the IMO/UNDP/GEF Regional Programme for the Prevention and Management of Marine Pollution in East Asian Seas which is conducting a number of courses for coastal managers in the East Asia region (Yu and Chua 1998).

**Table 3.** Programs with a concentration or specialization in Marine Affairs/ Marine Policy as part of another degree in the United States

Institution & Program	When Established	Average Number of Enrolled Students	Degree(s) Granted	Degree Requirements
College of William & Mary, Program of Study in Marine Resource Management and Policy		125 total ~ 55% in M.S.	M.S. and Ph.D. in marine science	36 semester hours
Duke University, Nicholas School of the Environment (NSE) Coastal Environmental Management Program	1991	~ 35 in Coastal Environmental Management	Master of Environmental Management	48 units of credit and master's project
Florida Institute of Technology	1978	~ 30	M.S. in Oceanography with option in Coastal Zone Management	30 semester credits and a 3-month internship
University of Hawaii School o Ocean & Earth Science and Technology Ocean Policy Certificate Program	1989	17	Graduate Ocean Policy Certificate	21 semester credits, including micro-thesis
University of North Carolina Master of Regional Planning with a specialization in Coastal Management	Early 1990s	~ 10 in coastal specialization	Master of Regional Planning	48 semester hours total (four core courses in coastal planning) and Master's project
University of West Florida Public Administration: Concentration in Coastal Zone & Natural Resources; Coastal Zone Studies	1978	35-50 in M.S. Bio Track 35 in M.P.A.	M.S. Biology M.P.A.	18 semester hours (out of 39 total for M.P.A. and 36 total for M.S.)

A number of ICM special courses are, of course, also offered by individual universities or other such educational institutions in different countries. Prominent examples include the coastal resources management course taught by the University of Rhode Island every summer, and the practical and field-oriented course on ICM offered by the Coastal Resources Institute of Prince of Songkhla University in Thailand.

### **Global Survey of ICM Courses**

There is, unfortunately, little systematic comparative information on the growing number of courses in ICM

being taught around the world, making it difficult to reach an overall assessment of what is being taught and with what success.

In view of the absence of systematic comparative data, the authors undertook, in collaboration with the Transatlantic Consortium on Marine Policy and Coastal Management,\* a survey of instructors conducting courses in the field. The survey was aimed at ascertaining the following: basic information on the structure of the course (including organization, duration, type of students, etc.), the major subject areas covered in the course, stages

<sup>\*</sup> The Consortium involves six university partners and seven other partners representing government, non-governmental organizations, and the private sector, all expert in the area of marine policy and coastal management. Its activities focus on facilitating the exchange of knowledge between partners regarding regional fisheries management and ocean and coastal management issues by establishing a series of postgraduate level educational-based cooperative linkages. The Joint Consortia Program is administrated on behalf of the European Community by the European Commission Directorate General for Education, Training and Youth ("DG XXII") and, on behalf of the United States Government, by the Fund for the Improvement of Postsecondary Education ("FIPSE") of the United States Department of Education.

Table 4. University Degree Programs Offering a Specialization in Integrated Coastal Management

Institution	Country	Degree
University of Technology, Sydney	Australia	Masters in Coastal Resource Management (Masters and Doctorate by research available)
James Cook University of North Queensland	Australia	B.A., B.Sc., M.A., Ph.D. Environmental Studies and Resource Management
Dalhousie University	Canada	Master of Marine Management
Dongguk University	Republic of Korea	Master in Marine Affairs
Universiti Pertanian Malaysia	Malaysia	Master in Environment
Universidad Autonoma de Baja California	Mexico	M.A. Marine ResourcesM.Sc./Ph.D. Coastal Oceanography (with resources management emphasis)
Centro de Investigación y Estudios Avanzados del INP Unidad Mérida	Mexico	M.Sc./Ph.D. Marine Resources
Asian Institute of Technology	Thailand	Ph.D./M.Sc./Diploma/Certificate Integrated Tropical Coastal Zone Management
Bornemouth University	UK	M.Sc./Post-Graduate Diploma, Coastal Zone Management
University of Newcastle upon Tyne	UK	M.Sc. and Diploma Tropical Coastal Management
University of Portsmouth	UK	M.Sc./Post-Graduate Diploma/ Certificate Coastal and Marine Resource Management
University of Wales, Cardiff	UK	B.Sc. Marine Geography: International Transport; Maritime Studies; M.Sc./L.L.M.: International Transport; Marine Policy; Legal Aspects of Marine Affairs

of the ICM process covered in the course, conceptual approaches covered in the course, natural processes covered, development and social issues covered, specific problems addressed in the course, disciplines emphasized in the course, whether case studies, internships, textbooks, field trips are part of the course, the financial basis of the course, and the extent to which networking and collaboration with other institutions are involved. A copy of the questionnaire may be found in Appendix 1.

### Conduct of the Survey

The survey was conducted in two stages.

First, authors Cicin-Sain and Knecht (Center for the Study of Marine Policy), with the assistance of Mirium Balgos, sent out the survey, via fax to seventy-one (71) institutions offering courses in ICM (both short-term ICM courses and ICM courses as part of an academic degree program) in the period of April to May 1998. As shown in Table 6, Thirty (30) questionnaires were returned with an overall response rate of forty-two (42) per cent. Table 7 shows the institutions responding to the survey (first those teaching short-term ICM courses and next those teaching ICM courses as part of a degree program).

Second, at the Genoa Conference on "Education and Training in Integrated Coastal Area Management: The

 Table 5. Research Centers doing work related to Integrated Coastal Management

Research Center	Country
America	
Coastal Resources Center, University of Rhode Island-	Rhode Island, USA
Center for the Study of Marine Policy, University of Delaware-	Delaware, USA
Ocean & Coastal Policy Center, University of California at Santa Barbara	California, USA
Law of the Sea Institute, University of Miami	Florida, USA
Urban Harbors Institute, University of Massachusetts at Boston	Massachusetts, USA.
Center for Ocean Law and Policy, University of Miami	Florida, USA
Marine Law Institute, University of Southern Maine	Maine, USA
Ocean and Coastal Law Center, University of Oregon	Oregon, USA
Center for Oceans Law and Policy, University of Virginia	Virginia, USA
Center for Coastal Management, Virginia Institute for Marine Science.	Virginia, USA
Marine Policy Center, Woods Hole Oceanographic Institution	Massachusetts, USA.
International Ocean Institute, Dalhousie University	Nova Scotia, Canada
Affairs et Resources Maritisme, Université du Quebec a Rimouski	Quebec, Canada
Oceans Institute of Canada	Nova Scotia, Canada
Marine Institute, Memorial University	Newfoundland, Canada.
Programa de Ecologia Pesquerias y Oceanografia del Golfo de Mexico (EPOMEX)	Campeche, Mexico-
Instituto de Ecologia, A.C.	Xalapa, Mexico
Instituto Technológico de Estudios Superiores de Montenrey Campus (ITESM)	Guaymas, Mexico
EULA-Chile Center, University of Concepción	Concepción, Chile
Island Research Center	Saint Thomas, Virgin Islands-
Universidade do Rio Grandè	Rio Grandè RS, Brazil
International Ocean Institute, National University	Heredia, Costa Rica
Europe·	
International Centre for Coastal and Ocean Policy Studies ·	Genoa, Italy
Grupo de Investigación en Ordenación del Litoral	Sevilla, Spain·
Coastal Zone Management Centre, Ministry for Transport, Public Works & Water Management	The Hague, the Netherlands
Centre for Coastal Zone Management, University of Portsmouth-	Portsmouth, England
MEDCOAST Institute	Ankara, Turkey·
L'Institut FRançais pour l'Exploitation de la MER (IFREMER)	Toulon, France
Institute of Ecological Economics, Stockholm University	Stockholm, Sweden
Fridtjof Nansen Institute	Lysaker, Norway
North Sea Centre	Hirtshals, Denmark.
International Ocean Institute, Romanian Marine Research Institute	Constanta, Romania
International Ocean Institute	Gzira, Malta·
Netherlands Institute for Law of the Sea	Utrecht, the Netherlands.
Department of Geography, University College Cork	Cork, Ireland

Table 5 (continuation). Research Centers doing work related to Integrated Coastal Management

Research Center	Country
Africa.	
International Ocean Institute, University of the Western	Cape Bellville, South Africa
International Ocean Institute	Dakar, Senegal
Coastal Center, University of Cape Coast	Cape Coast, Ghana
Asia/Pacific·	
Centre for Maritime Policy, University of Wollongong	NSW, Australia
Institute for Coastal Resource Management, University of Technology	Sydney, Australia
International Ocean Institute, State Oceanic Administration	Tianjia, China
International Ocean Institute, University of the South Pacific	Suva, Fiji
Institute of Marine Resources	Solomon Islands
International Ocean Institute, Indian Institute of Technology	Madras, India
Centre for Archipelago, Law, Development Studies	Jakarta, Indonesia
Center for Coastal and Marine Resources Study, Bogor Agricultural University	,
International Ocean Institute	Bogor, Indonesia
Korea Maritime Institute	Yokohama, Japan∙
Malaysian Institute of Maritime Affairs (MIMA)	Seoul, Korea
International Center for Living Aquatic Resource Management (ICLARM)	Kuala Lumpur, Malaysia-
IMO/UNDP/GEF Regional Programme for the Prevention and Management of Marine	Makati City, Philippines
Pollution.	Quezon City, Philippines
Southeast Asia Programme in Ocean Law, Policy, and Management (SEAPOL)	Bangkok, Thailand-
Coastal Resources Institute, Prince of Songkhla University	Hat Yai, Thailand
Pacific Centre for Environmental Law, National University of Singapore	Singapore

Table 6. Survey response rate

	Sent Out	Returned	Response Rate (%)
Short-term ICM Courses (4 weeks or less)	23	12	52
ICM Courses as Part of Academic (Degree) Program	48	18	38
Total	71	30	42

Mediterranean Prospect"\* participants at the conference who teach ICM courses were given the opportunity to participate in the survey. Four (4) additional responses were added to the sample (we received two responses

from DISSGELL – Institute of Geographic Science, University of Genoa, Italy; and another two responses from and University of Sannio, Italy), as noted at the bottom of Table 7.

<sup>\*</sup>The conference, organized by Dr. Adalberto Vallega, Vice President, International Geographical Union, in cooperation with the Government of the Republic of Italy, International Centre for Coastal and Ocean Policy Studies (ICCOPS), Intergovernmental Oceanographic Commission (IOC) of UNESCO, Co-ordinating Unit for the Mediterranean Action Plan (MAP) of UNEP, and International Centre for Science and High Technology (ICS) of UNIDO, was held in Genoa, Italy on May 25-29, 1998.

 Table 7. Survey responses received from the following Institutes

Teaching Short-Term Courses 1. Coastal Resources Center, University of Rhode Island Narragansett, 2. International Ocean Institute, Dalhousie University 3. FURG – Programme Train-Sea-Coast, Brazil 4. Coastal Resources Institute, Prince of Songkhla University 5. Ecocentrics Australia for Department of Natural Resources and Environment (Victoria) 6. GEFUNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research, East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China and Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Cener for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of City and Regional Planning, University of North Carolina. 15. Department of Uthan and Regional Planning, University of North Carolina. 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Pelaware 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miani, Florida, USA. 21. Marine Affairs Program, Dalhousie University 22. Deakin University of Marine and Atmospheric Sciences, University of Main, Florida, USA. 23. Coastal Management, University College Scarborough 24. Department of Human Geography, University of Sevilla 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management Centre, National Institute for Coastal and Marine Management Centre, National Institute for Coastal and Mar	Institute	State Country
1. Coastal Resources Center, University of Rhode Island Narragansett, 2. International Ocean Institute, Dalhousie University 4. Coastal Resources Institute, Prince of Songkha University 5. Ecocentrics Australia for Department of Natural Resources and Environment (Victoria) 6. GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of City and Regional Planning, University of North Carolina. 15. Department of Urban and Regional Planning, University of North Carolina. 16. Giraduate Department of Environmental, Coastal and Ocean Sciences, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousic University 22. Deakin University of Newcastle 23. Coastal Management, University College Scarborough 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Sciences and Coastal Management, University of Newcastle 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Marine Sciences and Coastal Management, University of Newcastle 28. Department of Marine Sciences and Coastal Management 29. DISSGELL – Institute of Geographic Science, University of Genoa  18. Marine Affairs Progr	Teaching Short-Term Courses	
3. FURG – Programme Train–Sea-Coast, Brazil 4. Coastal Resources Institute, Prince of Songkhla University 5. Ecocentrics Australia for Department of Natural Resources and Environment (Victoria) 6. GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research, East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of Urban and Regional Planning, University of North Carolina. 15. Department of Urban and Regional Planning, University of Hawaii 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 20. Oceanographic Center, Nova Southeastern University 21. Marine Policy Program, Graduate College of Marine Studies, University of Marine and Atmospheric Sciences, University of Marine Alfairs Program, Dalhousic University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management Centre, National Institute f		Rhode Island, USA.
4. Coastal Resources Institute, Prince of Songkhla University 5. Ecocentrics Australia for Department of Natural Resources and Environment (Victoria) 6. GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research, East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University Academic (Degree) Program 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of City and Regional Planning, University of North Carolina. 15. Department of City and Regional Planning, University of Hawaii 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 20. Oceanographic Center, Nova Southeastern University 21. Oceanographic Center, Nova Southeastern University 22. Deakin University 23. Coastal Management, University of Marine and Atmospheric Sciences, University of Maini, Florida, USA. 14. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Marine Geography, University of South Pacific  28. DisSGELL – Institute of Geographic Science, University of Genoa  29. DISSGELL – Institute of Geographic Science, University of Genoa  29. DISSGELL – Institute of Geographic Science, University of Genoa	2. International Ocean Institute, Dalhousie University	Halifax, Nova Scotia, Canada
5. Ecocentrics Australia for Department of Natural Resources and Environment (Victoria) and Environment (Victoria) 6. GEF/UNDP/MO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research, East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University Ankara, Turkey  Academic (Degree) Program 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of City and Regional Planning, University of Hawaii 15. Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Juniversity 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGEIL. – Institute of Geography, Counters of Genoa, Italy	3. FURG – Programme Train-Sea-Coast, Brazil	Rio Grande, Brazil
and Environment (Victoria)  6. GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas  7. Institute of Estuarine and Coastal Research, East China Normal University  8. National Marine Data and Information Service, State Oceanic Administration of China Administration of China Administration of China Indian Institute of Technology  10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology  11. International Center for Living and Aquatic Resources Management  12. MEDCOAST, Middle East Technical University  Academic (Degree) Program  13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California  14. Department of City and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Delaware  17. Marine Policy Program, Graduate College of Marine Studies, University of Polaware  18. North Carolina Sca Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousic University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Studies and International Transport  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL. — Institute of Geographic Sciences, University of Genoa  Business Asian Season  28. Desparate of Geography Cniversity of South Pacific  Additional Responses from the Genoa Conference	4. Coastal Resources Institute, Prince of Songkhla University	Hat Yai, Thailand
and Management of Marine Pollution in the East Asian Seas 7. Institute of Estuarine and Coastal Research, East China Normal University 8. National Marine Data and Information Service, State Oceanic Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 22. MEDCOAST, Middle East Technical University Academic (Degree) Program 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of North Carolina. 14. Department of City and Regional Planning, University of North Carolina. 15. Department of Urban and Regional Planning, University of Hawaii 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Studies and International Transport 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of Sevilla 28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGELL – Institute of Geographic Science, University of Genoa  And India Institute of Georaphic Science, University of Genoa		Melbourne, Australia
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Administration of China 9. International Ocean Institute, Operational Centre (India), Indian Institute of Technology 10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology 11. International Center for Living and Aquatic Resources Management 12. MEDCOAST, Middle East Technical University  Academic (Degree) Program 13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California. 14. Department of City and Regional Planning, University of North Carolina. 15. Department of Urban and Regional Planning, University of Hawaii 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	7. Institute of Estuarine and Coastal Research, East China Normal University	Shanghai, People's Republic of China
Indian Institute of Technology  10. Philippine Council for Aquatic and Marine Research and Development, Department of Science and Technology  11. International Center for Living and Aquatic Resources Management  12. MEDCOAST, Middle East Technical University  Academic (Degree) Program  13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California.  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy		Tianjin, People's Republic of China
and Development, Department of Science and Technology  11. International Center for Living and Aquatic Resources Management  12. MEDCOAST, Middle East Technical University  Academic (Degree) Program  13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California.  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Navecastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa		Madras, India
12. MEDCOAST, Middle East Technical University  Academic (Degree) Program  13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California.  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy		Los Baños, Laguna, Philippines
Academic (Degree) Program  13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California .  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sovilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Santa Barbara, California, USA  Chapel Hill, North Carolina, USA  Chapel Hill, North Carolina, USA  Boston, Massachusetts, USA.  Wewark, Delaware, USA.  Newark, Delaware, USA.	11. International Center for Living and Aquatic Resources Management	Makati City, Philippines
13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California .  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  29. DISSGELL – Institute of Geographic Science, University of Genoa  Santa Barbara, California, USA  Chapel Hill, North Carolina, USA.  Honolulu, Hawaii, USA.  Boston, Massachusetts, USA.  Wewark, Delaware, USA.  Newark, Delaware, USA.  Maleigh, North Carolina, USA.  Maleigh, North Carolina, USA.  Halifax, Nova Scotia, Canada  Miami, Florida, USA.  Halifax, Nova Scotia, Canada  Melbourne, Australia  Scarborough, United Kingdom  Newcastle, United Kingdom  The Hague, Netherlands  The Hague, Netherlands  The Hague, Netherlands  Sevilla, Spain  Suva, Fiji  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa	12. MEDCOAST, Middle East Technical University	Ankara, Turkey
13. Bren School of Environmental Science and Management, and Marine Science Institute, University of California .  14. Department of City and Regional Planning, University of North Carolina.  15. Department of Urban and Regional Planning, University of Hawaii  16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  29. DISSGELL – Institute of Geographic Science, University of Genoa  Santa Barbara, California, USA  Chapel Hill, North Carolina, USA.  Honolulu, Hawaii, USA.  Boston, Massachusetts, USA.  Wewark, Delaware, USA.  Newark, Delaware, USA.  Maleigh, North Carolina, USA.  Maleigh, North Carolina, USA.  Halifax, Nova Scotia, Canada  Miami, Florida, USA.  Halifax, Nova Scotia, Canada  Melbourne, Australia  Scarborough, United Kingdom  Newcastle, United Kingdom  The Hague, Netherlands  The Hague, Netherlands  The Hague, Netherlands  Sevilla, Spain  Suva, Fiji  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa	Academic (Degree) Program	
15. Department of Urban and Regional Planning, University of Hawaii 16. Graduate Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts 17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware 18. North Carolina Sea Grant, North Carolina State University 19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of Sevilla 28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGELL – Institute of Geographic Science, University of Genoa  Honolulu, Hawaii, USA. Boston, Massachusetts, USA.  Newark, Delaware, USA	13. Bren School of Environmental Science and Management,	Santa Barbara, California, USA
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University of Massachusetts  17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Newark, Delaware, USA.  Nanie, Florida, USA.  Halifax, Nova Scotia, Canada  Miami, Florida, USA.  Halifax, Nova Scotia, Canada  Melbourne, Australia  Scarborough, United Kingdom  Newcastle, United Kingdom  The Hague, Netherlands  Sevilla, Spain  Sevilla, Spain  Suva, Fiji	15. Department of Urban and Regional Planning, University of Hawaii	•
University of Delaware  18. North Carolina Sea Grant, North Carolina State University  19. Oceanographic Center, Nova Southeastern University  20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami  21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy		Boston, Massachusetts, USA.
19. Oceanographic Center, Nova Southeastern University 20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of Sevilla 28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGELL – Institute of Geographic Science, University of Genoa  Dania, Florida, USA.  Miami, Florida, USA.  Malifax, Nova Scotia, Canada  Melbourne, Australia  Scarborough, United Kingdom  The Hague, Netherlands  Sevilla, Spain  Suva, Fiji	17. Marine Policy Program, Graduate College of Marine Studies, University of Delaware	Newark, Delaware, USA.
20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami 21. Marine Affairs Program, Dalhousie University 22. Deakin University 23. Coastal Management, University College Scarborough 24. Department of Marine Sciences and Coastal Management, University of Newcastle 25. Department of Marine Studies and International Transport 26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management 27. Department of Human Geography, University of Sevilla 28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference 29. DISSGELL – Institute of Geographic Science, University of Genoa  Miami, Florida, USA.  Halifax, Nova Scotia, Canada  Melbourne, Australia  Scarborough, United Kingdom  Newcastle, United Kingdom  The Hague, Netherlands  Sevilla, Spain  Suva, Fiji  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	18. North Carolina Sea Grant, North Carolina State University	Raleigh, North Carolina, USA.
21. Marine Affairs Program, Dalhousie University  22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	19. Oceanographic Center, Nova Southeastern University	Dania, Florida, USA.
22. Deakin University  23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Melbourne, Australia Scarborough, United Kingdom  Newcastle, United Kingdom  The Hague, Netherlands  Sevilla, Spain Suva, Fiji  Additional Responses from the Genoa Conference  Genoa, Italy	20. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami	Miami, Florida, USA.
23. Coastal Management, University College Scarborough  24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	21. Marine Affairs Program, Dalhousie University	Halifax, Nova Scotia, Canada
24. Department of Marine Sciences and Coastal Management, University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	22. Deakin University	Melbourne, Australia
University of Newcastle  25. Department of Marine Studies and International Transport  26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	23. Coastal Management, University College Scarborough	Scarborough, United Kingdom
26. Coastal Zone Management Centre, National Institute for Coastal and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy		Newcastle, United Kingdom
and Marine Management  27. Department of Human Geography, University of Sevilla  28. Marine Affairs Programme, University of South Pacific  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy	25. Department of Marine Studies and International Transport	Cardiff, United Kingdom
28. Marine Affairs Programme, University of South Pacific  Suva, Fiji  Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa  Genoa, Italy		The Hague, Netherlands
Additional Responses from the Genoa Conference  29. DISSGELL – Institute of Geographic Science, University of Genoa Genoa, Italy	27. Department of Human Geography, University of Sevilla	Sevilla, Spain
29. DISSGELL – Institute of Geographic Science, University of Genoa Genoa, Italy	28. Marine Affairs Programme, University of South Pacific	Suva, Fiji
29. DISSGELL – Institute of Geographic Science, University of Genoa Genoa, Italy	Additional Responses from the Genoa Conference	
	-	Genoa. Italy
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Table 8 shows the distribution of respondents according to geographical location and according to whether they taught short-term courses as part of a degree program. As seen in Table 8, twelve (12) of the responses concerned short-term courses and twenty-two (22) of the responses concerned academic degree courses. In terms of geographical location, most of the respondents came from North America, Europe, and Asia, with only one from Central and South America and none from Africa (which reflects, as we conclude, the general absence of ICM training efforts in the later regions).

#### Results of the Survey

Table 9 compares the nature of ICM courses taught in academic programs to ICM short-term courses, which reveals a number of similarities and differences. Among the survey respondents, the academic programs were designed predominantly (eighty-six per cent) for graduate students who mainly are nationals of the country where programs located, whereas short-term courses were for professionals, volunteers and managers largely from foreign countries. The average course duration for courses as part of academic programs and for short-term training courses was one semester (about four hours per week) and four weeks (about twenty-eight hours per week), respectively.

The average size of academic program classes was twenty-eight students, a smaller size (twenty-two participants) was found in short-term training classes. The majority, if not all, of both types of ICM courses used case studies, which were drawn from local and regional experiences. While most of academic programs (eighty per cent) emphasized the use of textbooks from various disciplines and authors, many short-term ICM courses produced their own course materials. About ninety per cent of the short-term ICM courses involved field trips to local areas, a much smaller figure was found in the academic programs (sixty per cent). We also found that the predominant source of finance for the academic programs were from universities (e.g., tuition), whereas the short-term courses received funding from various sources, including governments, international donors, and private foundations.

Tables 10 through 16 show the results of the survey on the context of the ICM courses: 1) the major subject areas covered, 2) the stages of the ICM process emphasized, 3) conceptual approaches covered, 4) natural processes covered, 5) development and social issues, 6) specific problems addresses, 7) disciplines emphasized, and 8) the international context of the courses.

Perusal of Table 10 through 16 generally reveals remarkable congruence among respondents on the context of ICM courses, although some predictable differences exist between short-term courses and academic courses. With regard to Table 10 the major subject areas taught are, for both groups: 1) conceptual basis of ICM, 2) institutional aspects, 3) stages in the ICM process, and 4) case studies.

As to stages of ICM process, Table 11 shows that detailed ICM stages were covered in academic programs while receiving major emphasis in short-term courses (e.g., practical discussion of how to get ICM in place). Several stages were highlighted in both academic programs and short-term courses, including setting ICM goals, issue identification, prioritizing issues, setting boundaries, program adoption and implementation, developing an ICM plan, and constituencies/partnerships building.

Regarding ICM conceptual approaches, as shown in Table 12, approaches receiving major attention from both courses were structure of multiple uses, integration (in general), integration between different levels of government, and integration between sectoral agencies. From Table 13 to 15, a series of issues pertaining to integrated coastal management (i.e., natural process, development and social issues, and specific problems) were covered in both academic and short-term courses, but were not emphasized.

On major disciplines emphasized in courses (Table 16), both academic programs and short-term courses utilized knowledge from all relevant disciplines to some extent. It is noted that ecological science, political science and law received a major emphasis in academic programs. With regard to the international content of ICM (Table 17), both academic programs and short-term courses recognized the role of major conventions, guidelines and programs in ICM to some extent. The only one given emphasized was Agenda 21, Chapter 17 of the United Nations Conference on Environment and Development (UNCED).

In sum, it appears from our survey that the following points may describe the present character or quality of education and training in integrated coastal management:

- 1. The knowledge of ICM concepts and processes was a common feature of the surveyed courses, with some diverse degrees of emphasis.
- 2. Most of the surveyed courses were designed to introduce important features and elements of ICM; e.g., focus on conceptual backgrounds, the role of integration concept, and practical skills for specific

 Table 8. Geographical location of survey respondents

	North America	Central/South America	Europe	Africa	Asia/Pacific	World
Short-term Courses	2	1	1	-	8	12
Academic (Degree) Program	11	-	9	-	2	22
Total	13	1	10	-	10	34

Table 9. Survey results: Nature of Courses/Programs

	Academic Program	Short-Term Training
Academic level	Designed predominantly for graduate level (approximately 86%)	In-service training for professionals
<b>Average Course Duration</b>	• 18.5 weeks	• 4 weeks
	• 3.6 hours/week	• 28 hours/week
<b>Type of Special Projects Used</b>	Research Papers	Management Plan
	Presentations	Group Project/Case-Studies
	Experiments	
Average Size of Classes	• 28 students	• 22 participants
Mix of Foreign/Local Students/Participants	• 20/80	• 60/40
Use of Case Studies	More than 85% used case studies, which played either a core or important role in the course     Cases were selected from local research projects and/or regional experiences	<ul> <li>All courses (100%) used case studies</li> <li>Most training centers use their participating field program as case studies</li> </ul>
Use of Textbooks	80% responded that textbooks played an important role in the course	<ul><li>60% considered textbooks as important</li><li>Course materials were mainly developed</li></ul>
	Textbooks were selected from various disciplines and authors	by institutes
Use of Field Trips	60% involved field trips (to local areas)	• 90% involved field trips (to local areas)
Financing	Predominantly from university (Tuition)	Various sources, including governments, international donors, and private foundations

Table 10. Survey Results: Major Subject Areas (in percentage)

MATOD CUDIECT ADEAS	Academic	Program	Short Term Training	
MAJOR SUBJECT AREAS	Major Emphasis	Covered	Major Emphasis	Covered
Conceptual basis of ICM	60	37	60	33
Environmental science	50	30	38	54
Institutional aspects	90	10	57	36
Economic/social topics	25	70	8	85
Cultural heritage management	6	50	9	46
Sectoral planning (e.g., fisheries)	25	50	25	58
Spatial planning (e.g., waterfront)	16	60	15	54
Special planning (e.g., endangered species)	33	33	8	62
Economic tools (e.g., taxes)	11	53	0	46
GIS tools	5	30	8	58
Stages in ICM process	45	30	43	50
Environmental impact assessment	25	55	8	85
Conflict management	25	60	17	83
Case studies	55	35	38	61

management situations. A widely discussed issue was conflicts among coastal users.

- 3. Whereas multiple coastal-related disciplines were utilized in ICM courses, a relatively less explored area was the role of economic principles in ICM.
- 4. Case studies were commonly used to reflect what have been learned from ICM practice. While on the contrary, international guidelines and agreements were received a relatively less attention.

### Outstanding Issues in the Further Development of Education and Training in Integrated Coastal Management

We see five major issues in the further development of ICM education and training: 1) reaching consensus on core concepts and frameworks in the field, 2) the need to tailor the content of ICM courses to fit varying contexts, 3) realizing holism in ICM, 4) the need for networking in ICM education and training, and 5) special issues

associated with building capacity in ICM in the developing world.

### Content of ICM Education and Training: Core Concepts and Frameworks in the Field

"ICM" may be used to mean many things to many people. The concept is currently so popular among international and national-level entities in many countries, that a "bandwagon effect" appears to be occurring, in some instances. Courses solely on coastal processes, for example, are in some cases being labeled "Integrated coastal management." While diversity in approaches and orientations is healthy, and is warranted by the divergence in coastal contexts around the world, there should be some overall consensus on core concepts, frameworks, and methodologies in ICM. Reaching of this kind of consensus is a natural step in the evolution of disciplines and indicates a process of "maturation" of the field of ICM. The results of our survey strongly suggest that such

 Table 11. Survey Results: Stages of ICM Process (in percentage)

	Academic	Program	Short Term	Short Term Training	
STAGES OF ICM PROCESS	Major Emphasis	Covered	Major Emphasis	Covered	
Setting goals	30	60	58	33	
Issue identification and analysis	29	62	67	33	
Prioritizing issues	26	63	62	38	
Setting boundaries	25	70	42	50	
Program adoption and implementation	12	71	58	33	
Uses to be managed	25	60	25	75	
Habitats and species to be protected	29	52	9	64	
Cultural heritage to be protected	5	60	10	50	
Developing an ICM plan	16	60	58	25	
Constituencies/partnership building	10	60	42	33	
Selecting lead agency for ICM	17	56	30	50	
Selecting the co-ordination mechanism	20	50	18	73	
Selecting management	26	37	33	58	
Putting the ICM program in operation	16	47	25	50	
Public participation program	10	55	17	58	
Monitoring and evaluation program	16	47	33	50	

a consensus on what needs to be taught in ICM courses is clearly emerging.

### The Need to Tailor the Content of ICM Courses to Fit Varying Contexts

Virtually all discussions of ICM recognize and stress the need to tailor the design of ICM programs to fit the particular context within which it will exist. While very much agree with this notion, we wish to emphasize that the degree to which tailoring is needed and should be taught depends very much on the particular aspect of the ICM process being considered.

Aspects of the ICM process requiring minimum tailoring. Elements of ICM courses dealing with the physical processes involved in coastal systems (beaches, coral reefs, mangroves, temperate wetlands, etc.) are likely to be taught in a generally similar manner

everywhere these resources occur. Although, of course, each coastal context is unique, beach processes (sorting, sand transport, dune formation, erosion, etc.), for example, tend to function in similar ways everywhere as other physical processes operate in a similar fashion in most places.

#### Aspects of the ICM process requiring some tailoring.

Education and training courses that focus on managing and protecting resources such as beaches, however, will need to take account of the types of management measures that are appropriate, culturally acceptable, and legally suitable in different governmental settings. For example, is a regulatory approach employing coastal permits appropriate or is the use of economic incentives of some sort better suited in some circumstances? In some cultures, it may be much more effective to rely on customary rules as articulated and updated by traditional leaders.

 Table 12. Survey Results: Conceptual approaches (in percentage)

CONCEPTUAL APPROACHES	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
Global climate change	16	42	0	67
Structure of coastal ecosystems	30	50	15	85
Structure of multiple uses	47	53	23	69
Integration (general)	37	63	46	46
Integration between levels of decision making	53	42	43	43
Integration between sectoral agencies	50	45	46	46
Spatial integration (land, sea)	32	60	25	75
Temporal integration (short and long-term plans)	26	63	15	77
Social integration1	10	80	21	57
Indigenous peoples issues	5	37	9	46
Economic organization1	11	39	0	55
Ecosystem management	25	55	31	54
Water dependence	21	53	10	60

 Table 13. Survey Results: Natural processes (in percentage)

NATURAL PROCESSES	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
Sea-level rise	10	52	0	75
Coastal erosion	15	60	33	58
Longshore drift system	11	47	18	55
Pollution dynamics	11	53	10	80
Wetland functioning	21	53	0	64
Estuarine functioning	14	48	0	82
Delta functioning	5	14	0	20
Ecosystem change due to climate change	5	43	0	55
Beach and dune functioning	10	55	18	55
Currents, waves, storms	10	50	18	73

Table 14. Survey Results: Development and social issues (in percentage)

DEVELOPMENT AND SOCIAL ISSUES	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
Seaport development	5	53	9	73
Fishery development	25	55	9	73
Coastal tourism and recreation	20	75	23	69
Ecotourism	14	62	0	75
Aquaculture development	5	64	15	62
Energy development	15	45	0	36
Waterfront revitalization	5	60	9	55
Historical sites restoration	0	40	10	50
Urban development	5	68	25	75

 Table 15.
 Survey Results: Special problems addressed (in percentage)

SPECIFIC PROBLEMS ADDRESSED	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
Coastal erosion, sea level rise	24	59	17	67
Coastal natural hazards	21	60	0	80
Wetland degradation	20	55	0	55
Mangrove loss	20	40	0	82
Coral reef degradation	10	45	0	64
Habitat and species loss	30	50	0	73
Non-point source pollution	26	47	11	78
Eutrophication	5	70	0	73
Conflicts among coastal uses	50	50	0	100
Fisheries abundance/management	25	50	0	73
Land mining impacts	6	39	0	50
Offshore oil impacts	21	47	0	61
Ecosystem restoration	26	42	18	64
Public access	39	50	18	64

Table 16. Survey Results: Disciplines emphasized (in percentage)

DISCIPLINES EMPHASISED	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
Physical sciences	18	30	30	60
Ecological science	30	50	33	67
Sociology, human anthropology, history	5	80	18	46
Political science / public administration	33	57	33	42
Law	55	30	36	46
Economics	15	55	9	46
Geography	10	50	9	73

 Table 17. Survey Results: International Content (in percentage)

INTERNATIONAL CONTENT	Academic Program		Short Term Training	
	Major Emphasis	Covered	Major Emphasis	Covered
LOS Convention	21	53	20	30
UNCED Agenda 21, Chapter 17	45	45	33	42
Climate Change Convention	21	47	9	36
Biological Diversity Convention	29	48	9	36
MARPOL, London Convention	5	50	0	40
Regional conventions	6	50	18	36
Guidelines from UN organizations	11	42	18	36
Guidelines from other intergovernmental organizations	0	53	10	50
Programme of Action for Land-based sources of marine pollution	11	42	18	36

Aspects of the ICM process requiring detailed tailoring. Those aspects of an ICM program that involve institutions and their interactions clearly need to be carefully tailored to fit particular governmental situations and a very important part of the ICM training and education should focus on these aspects. In this respect, two aspects of ICM program design stand out: 1) the institutional arrangements necessary to bring about effective policy harmonization and program coordination between the various sectors operating in the coasts and oceans (fisheries, water quality, offshore oil and gas, coastal planning, etc.), and 2) the institutional arrangements necessary to provide an adequate level of coordination/harmonization between the levels of government affecting the coastal and ocean areas (national/central government, provincial/state government, local government). Obviously, the particular arrangements chosen to meet these two needs will greatly depend upon the governmental structure in a particular nation, the manner in which it conducts its activities, the relative power of the various departments or ministries, the existence of central coordination or management entities at levels above these departments or ministries, the distribution of power between central government and the lower levels of government, and so on. education and training courses must also be tailored to provide insight and information that will be pertinent in these varying situations.

### Realizing "Holism" in ICM

Dealing with the interconnected parts of the coastal zone is a fundamental requirement of ICM. Yet how is this "holism" concept realized in a practical way, and importantly, how can it best be taught?

Realizing the goal of holism, in our view, starts with the setting of goals for the ICM program which determine which resources and what activities are to be managed. This bundle of activities and resources (both seaward and shoreside) determines the areas within which the ICM program should operate (and, hence, the management boundaries). The area, in turn, determines the governmental jurisdictions that must be involved and, after a survey of on-going or planned activities, the sectors that must be represented. Holism will be realized when the policies and activities of all of the affected jurisdictions and sectors are effectively harmonized to achieve the goal(s) that were agreed for the ICM effort.

Teaching of this aspect of ICM, therefore, requires careful instruction in the setting of ICM goals (usually involving a strategic assessment of problems and prospects), the mapping of governmental jurisdictions,

the inventorying of sectoral activities, the determination of the management areas and the setting of the landward and seaward boundaries within which the ICM program is to function.

### The role of Integration

Integration can be seen as one of the tool or methodologies for realizing the goal of holism. As discussed earlier, we see the need for at least five different dimensions of integration – between sectors, between levels of government, across the land-water interface, and between nations (especially when nations share an enclosed or semi-enclosed water body).

Teaching integration, in our view, means carefully and systematically examining each of these interfaces, understanding the conditions that prevail on each side, and the mechanisms that exist for successfully "bridging" the gap. In a physical sense, water is the integrating force across this interface. What happens on the shore (pollution run-off from agricultural activities, for example), directly affects the quality of coastal waters. Methods must be found for effectively managing the land activities that adversely affect coastal waters. Students must understand the different jurisdictions that exist on the land side (most likely local government control of land use) and on the water side (often under the specialized control of agencies of the central government), and, as well, about tools and techniques that can be brought to bear to meaningfully relate what happens within the land jurisdictions that can adversely affect marine jurisdictions and the resources they contain. Conducting environmental impact statements on such proposed shoreland developments is one approach. A more effective way to handle this need might be the creation of a coastal management agency whose jurisdiction covers both the landside and the ocean side of the coastal zone and require that proposals for developments that could affect the marine environment secure a "permit" from that agency. A third alternative could be the formation of a "coordinating" council or commission made up of all the agencies that have jurisdiction over either the land side or the seaside of the coastal zone provided that such a body had a clear set of policies and goals to guide its decisionmaking. Studying problems and policy options such as these is one way of teaching integration.

### How Can "Multidisciplinarity" be Taught?

Holism ideally means that all aspects of an issue or consequences of a decision are considered – natural science questions, economic, socio-cultural, legal, institutional, etc. Can coastal managers be taught to

 Table 18.
 Tools for integration

Integration Between	E.I.A.	Coastal permit	Coordinating Council	Common Standards
Sectors	++	+++	++	+
Levels of Government	++	+	+++	++
Land-water	++	+++	++	+
Disciplines	+	+	++	++
Nations	+	NA	++	+++

Note: +++ very useful ++ probably useful + of questionable use NA not applicable

function successfully within all of these disciplinary areas? Not really, of course. What we can do (and actually do in many ICM courses) is to acquaint students with some of the key concepts found in each of the disciplines most important to ICM. For example, at the University of Delaware, most of our ICM students will not emerge as doctoral-level economists, but they will have been exposed to the fundamentals of environmental economics and the economics of natural resources management. Similarly, they will not, in general, be trained as lawyers, but will have learned a great deal about the role of law in coastal management, the specifics of most of the key coastal and ocean laws in the U.S., something about international ocean law and how it operates, as well as knowledge about the different institutional forms that ICM can take in different countries. Hence, we believe that ICM students must have a broad educational experience. If they entered the training program as biologists, the social sciences side (political science, economics, etc.) must be filled out; if they entered the program as political scientists, on the other hand, the natural sciences (especially oceanography and biology) must be added. Ideally, the properly educated coastal manager will know enough about all of the principal disciplines involved to oversee the work of specialized staff and contract for additional expertise when this is required for his/her program.

#### The Need for Networking

Another major challenge or issue in teaching and training in ICM is the need for further development of networks or ties among the many institutions around the world that are engaged in teaching and training in the field. Some efforts at networking are already taking

place, and further efforts could build on these. For example, the teaching and research programs in marine affairs and policy in the U.S. joined together in 1991 to form a professional association - the Marine Affairs and Policy Association (MAPA) – which now numbers more than 250 dues-paying individuals and institutional members. The Association puts out a directory of contacts in the field (with over 800 entries), operates an internet information service, and organizes discussions about the field in various conferences and other fora. Another networking effort, the SEAWEB, was launched in 1994. Forming networks among these networks, such as through the establishment of some kind of global network, such as an international union of coastal management education associations, would fulfill at least two major functions: 1) enhance the sharing and dissemination of current practices of teaching and training in the field, and thus advance the process of maturation of the field; and 2) present a more united voice in international fora on oceans and coasts (involving United Nations entities and others).

#### Building ICM Capacity in the Developing World

A major problem in teaching and training efforts in ICM in developing countries is that there is an abundance of short-term courses on ICM and related subjects in which individuals from developing nations frequently participate, but very few established educational degree programs in ICM may be found in developing nations. The typical result is often that many developing nation individuals end up having participated in a string of courses on or related to ICM, but have no overall education in the field, nor professional credentials to work in the field.

There is thus, an urgent need, in our view, to build incountry capacity on ICM in developing countries. One model for doing this might be the designation of incountry (or regional-level) university-based programs of excellence in ICM to which would flow assistance and advice from the multinational banks and other donors. To build capacity, "partnering" arrangements could be established with universities in other countries to assist with the development of curricula, teaching materials, long distance learning, and the like.

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